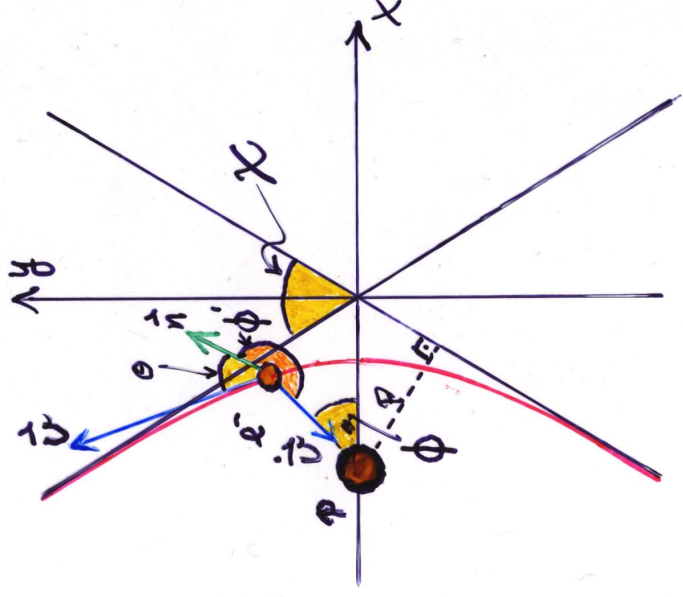
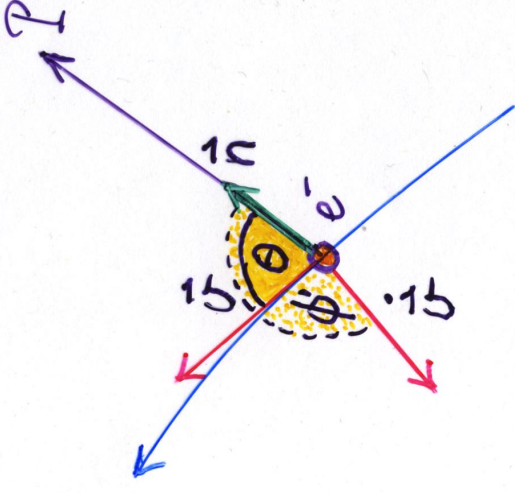


2. Continuum radiation processes

2.1 Radiation of accelerated particles

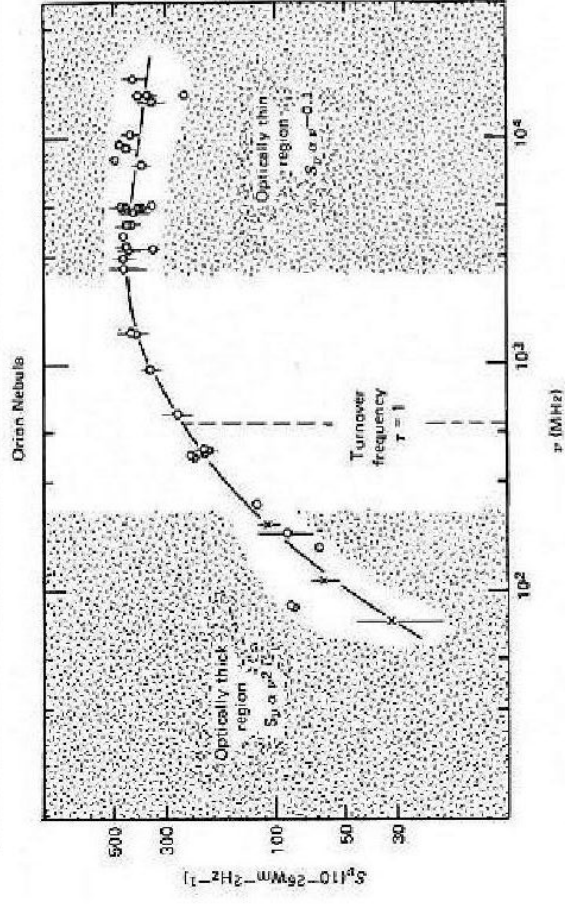
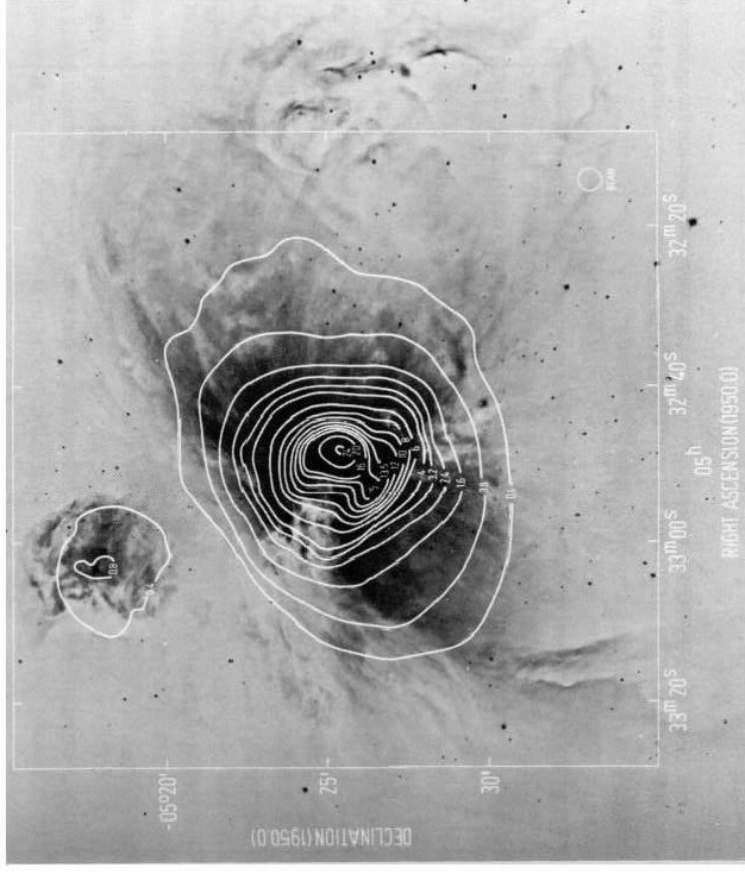


ion – electron interaction:
geometry and hyperbolic path

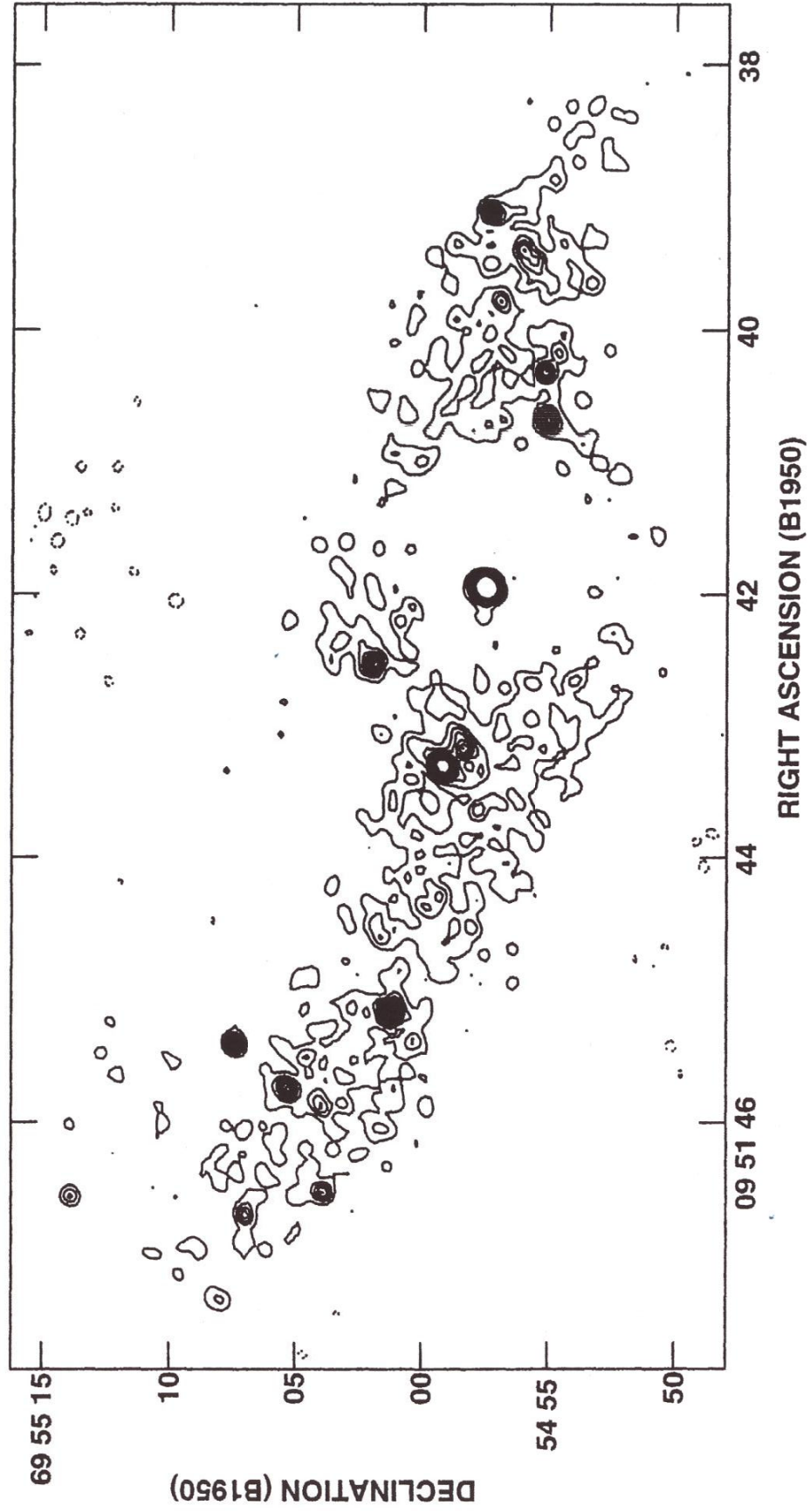
free-free radiation from Ori A (M 42):



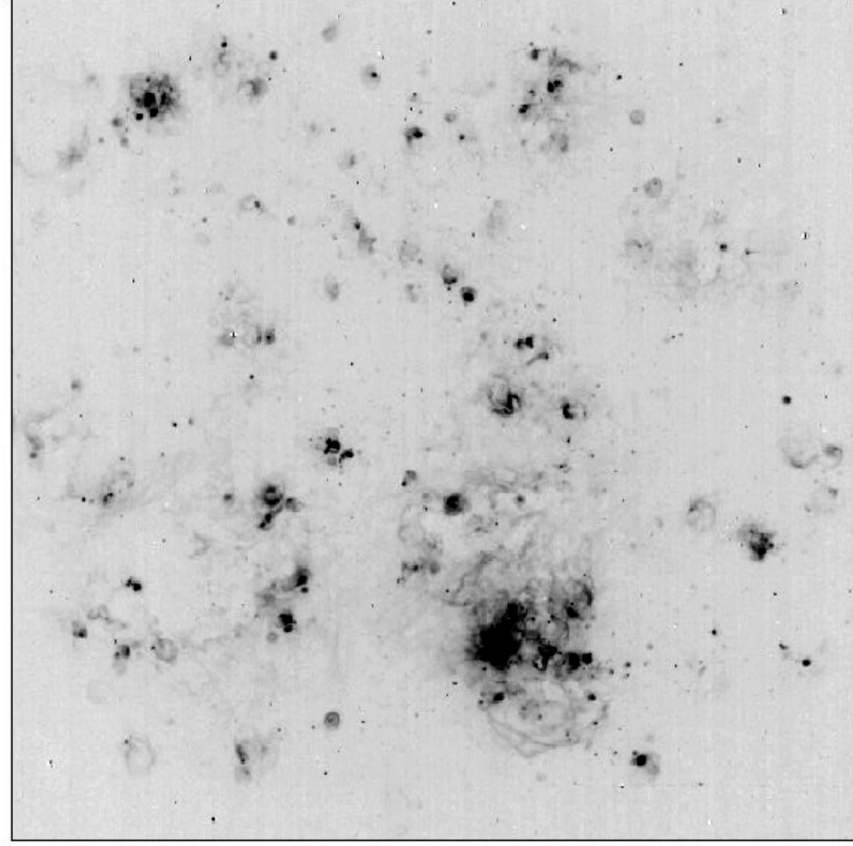
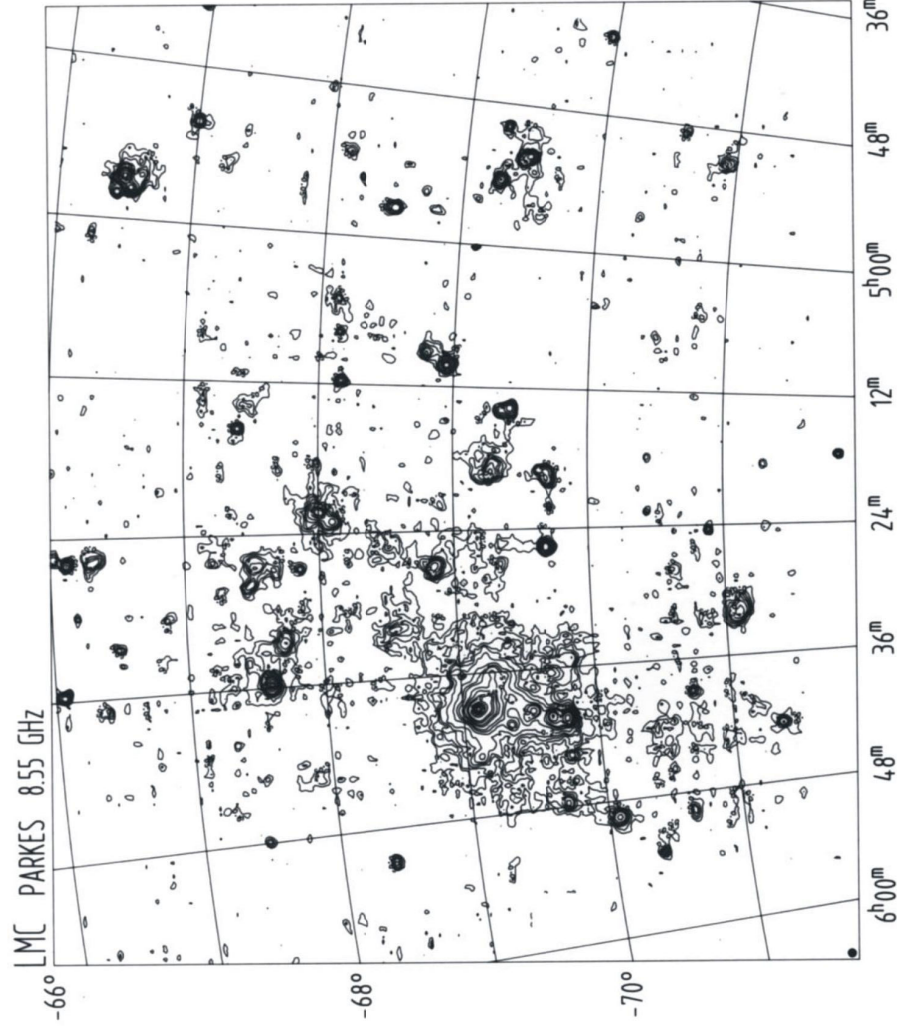
**Orion Nebula: Balmer line
and free-free emission**



free-free absorption in M 82



free-free radiation from the LMC:

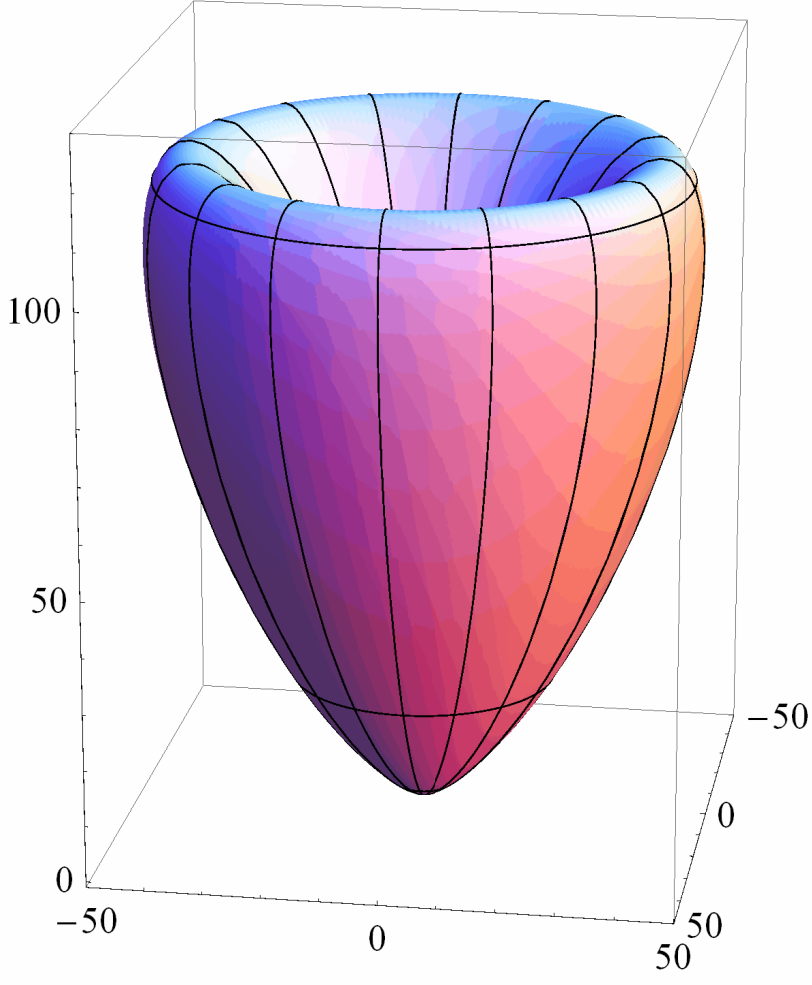
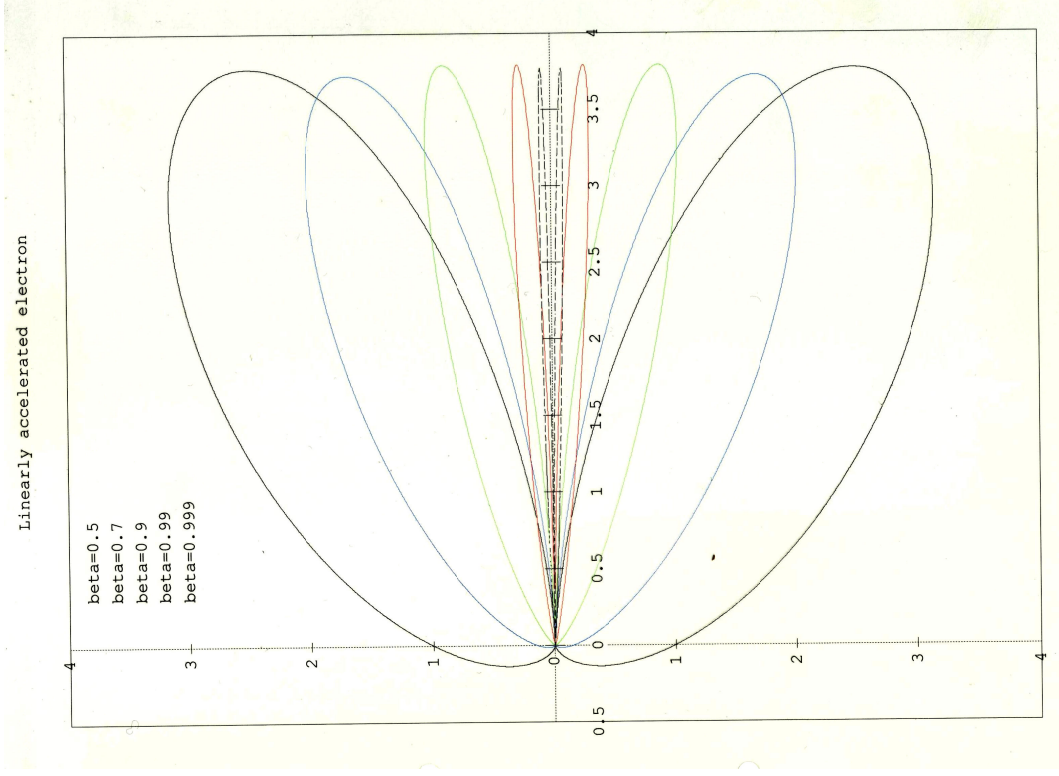


H α @ 6563 Å

radio continuum @ 8.4 GHz

2.3 Synchrotron radiation

relativistic electron: linear acceleration

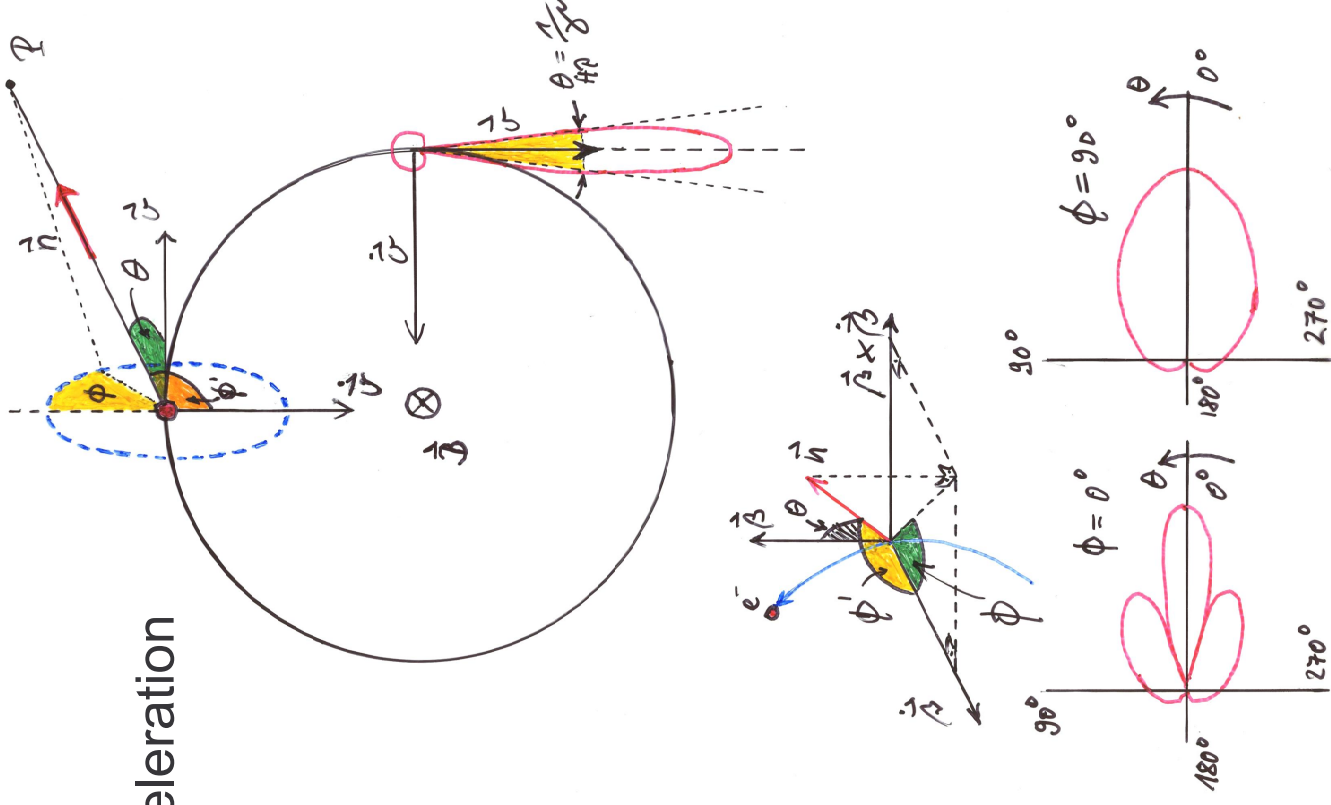


N.B.: the above left diagram is not to scale; black dashed line should be stretched by 10^{10} w.r.t. solid black line

2.3 Synchrotron radiation

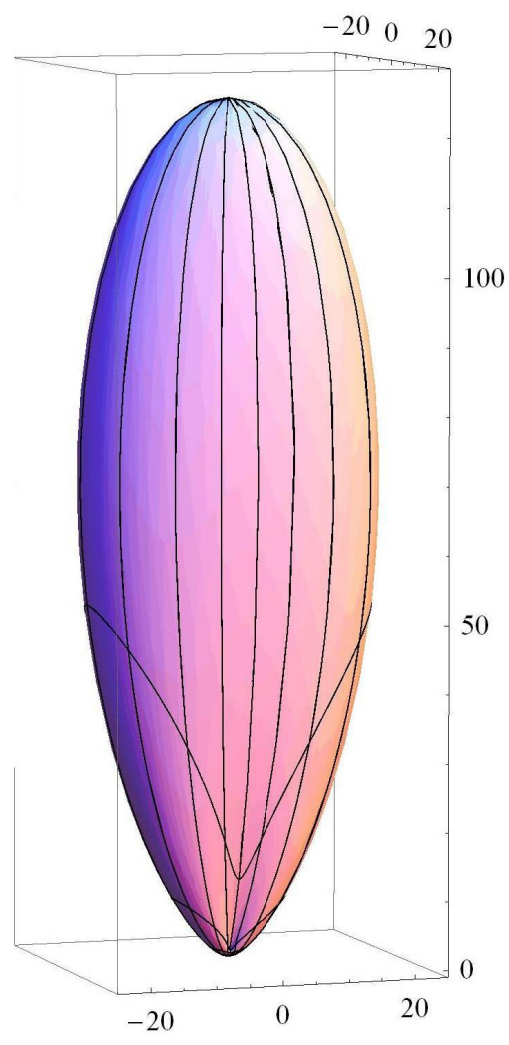
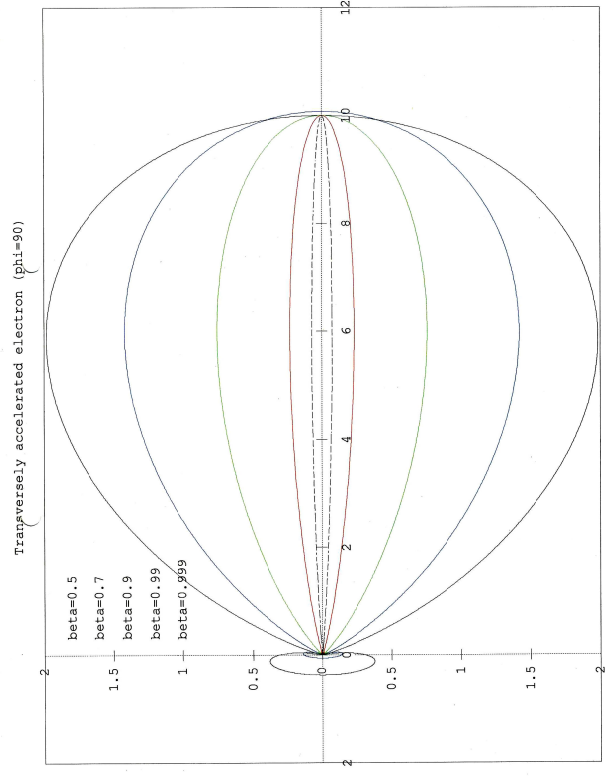
relativistic electron: transverse acceleration

synchrotron radiation and geometry for a relativistic electron spiraling around a magnetic field **B** pointing away from us



2.3 Synchrotron radiation

relativistic electron: transverse acceleration

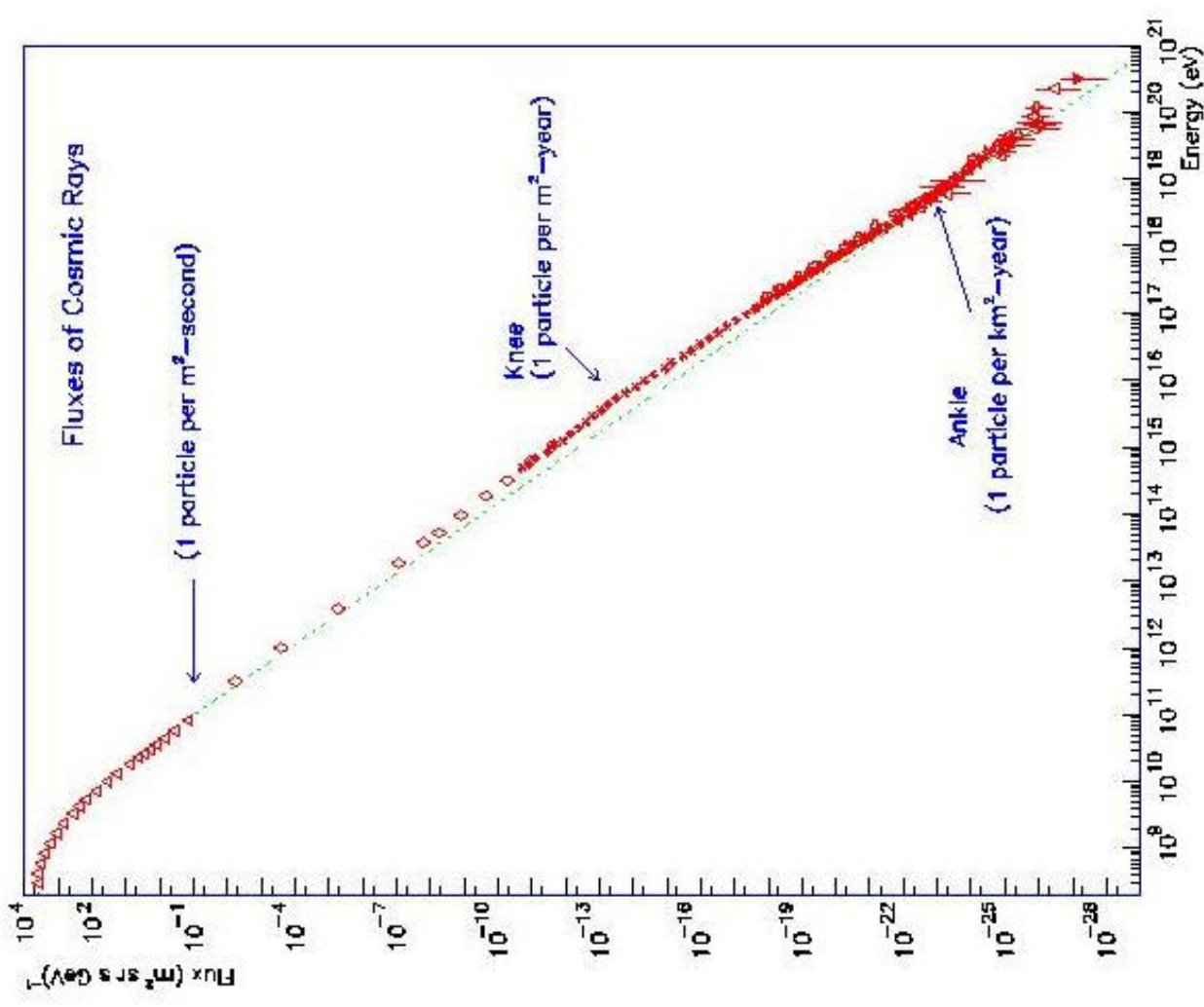


N.B.: the above left diagram is not to scale; black dashed line should be stretched by $5.3 \cdot 10^7$

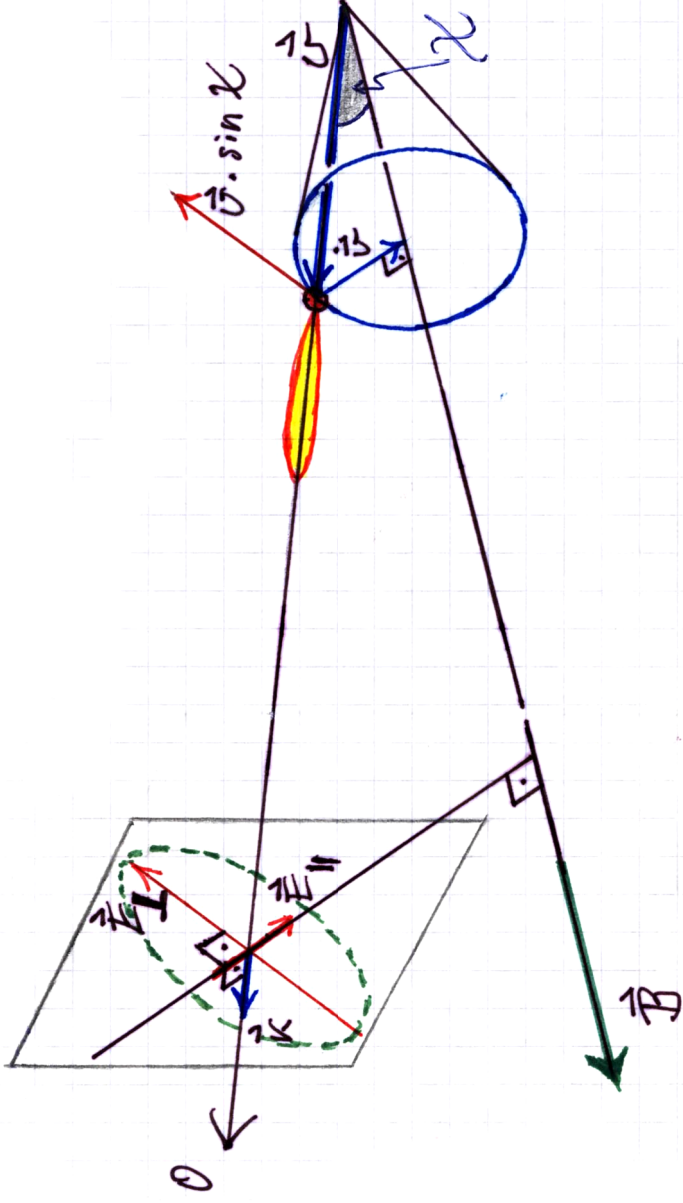
energy spectrum of cosmic rays
near earth

power-law over large energy
range

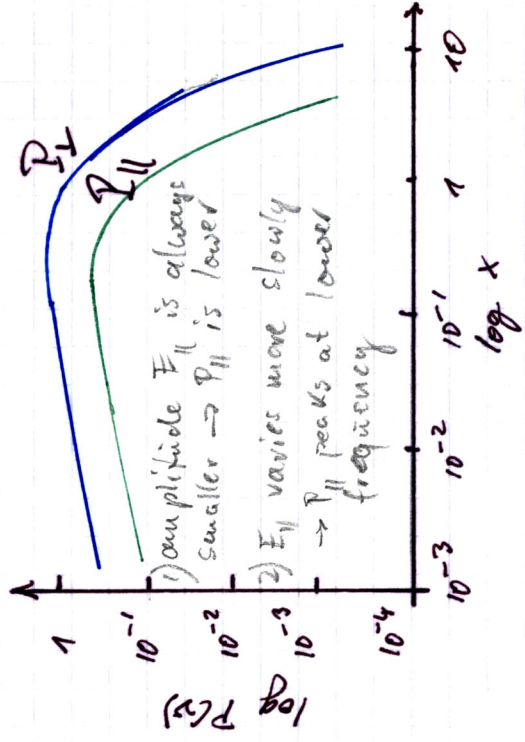
$$N(E) dE = A \cdot E^{-8} dE$$



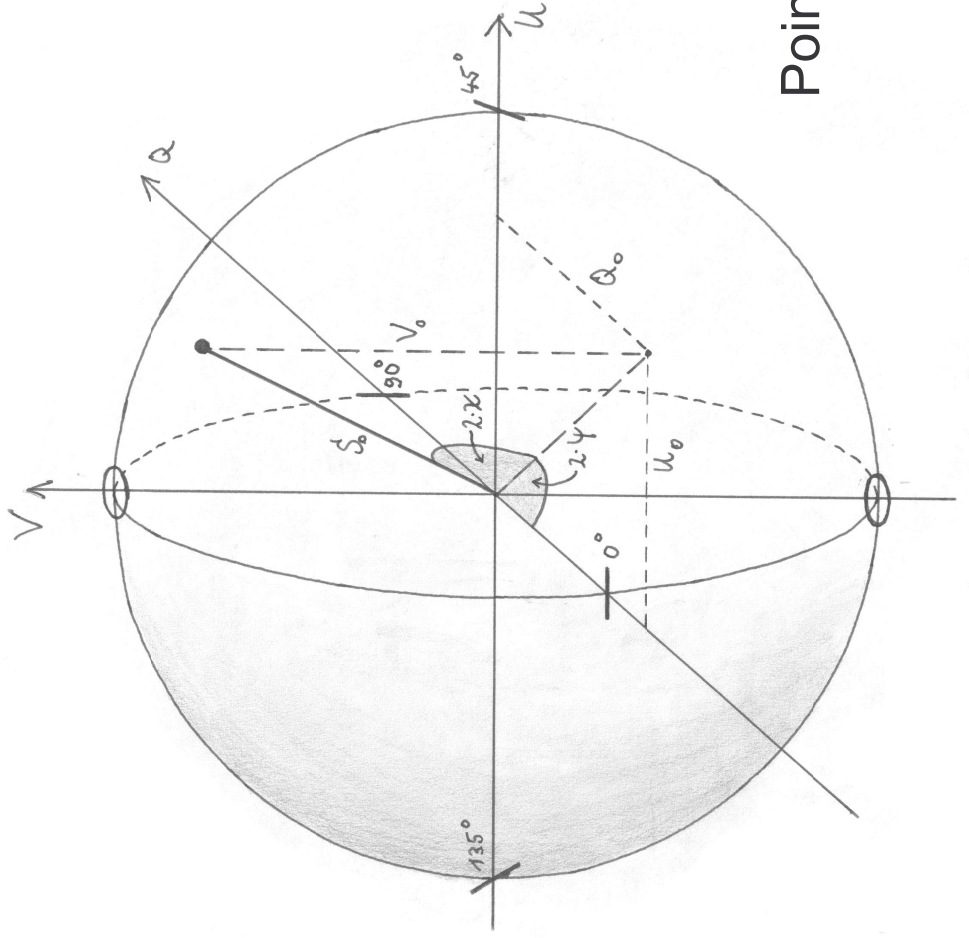
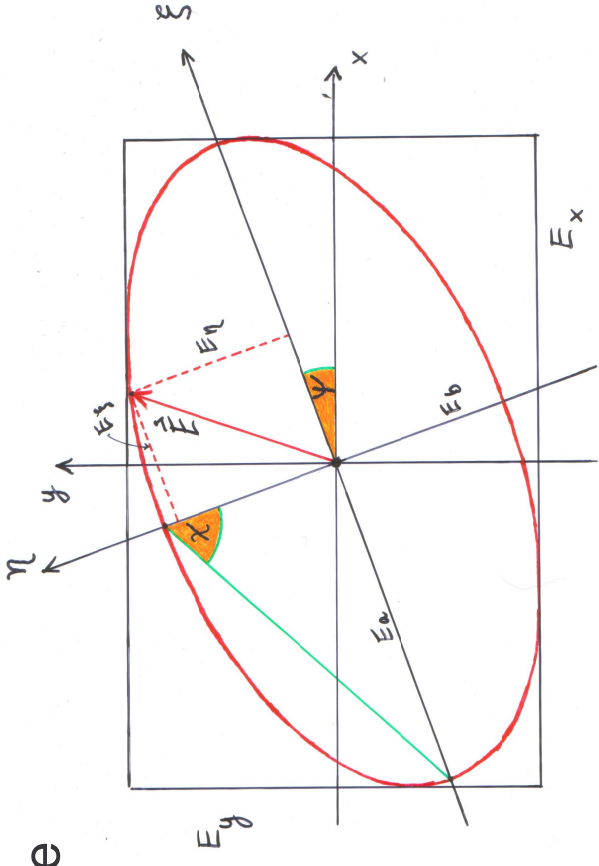
geometry of relativistic particle emitting synchrotron radiation



radiation spectra of single relativistic particle, for power of electric field parallel and perpendicular to the magnetic field

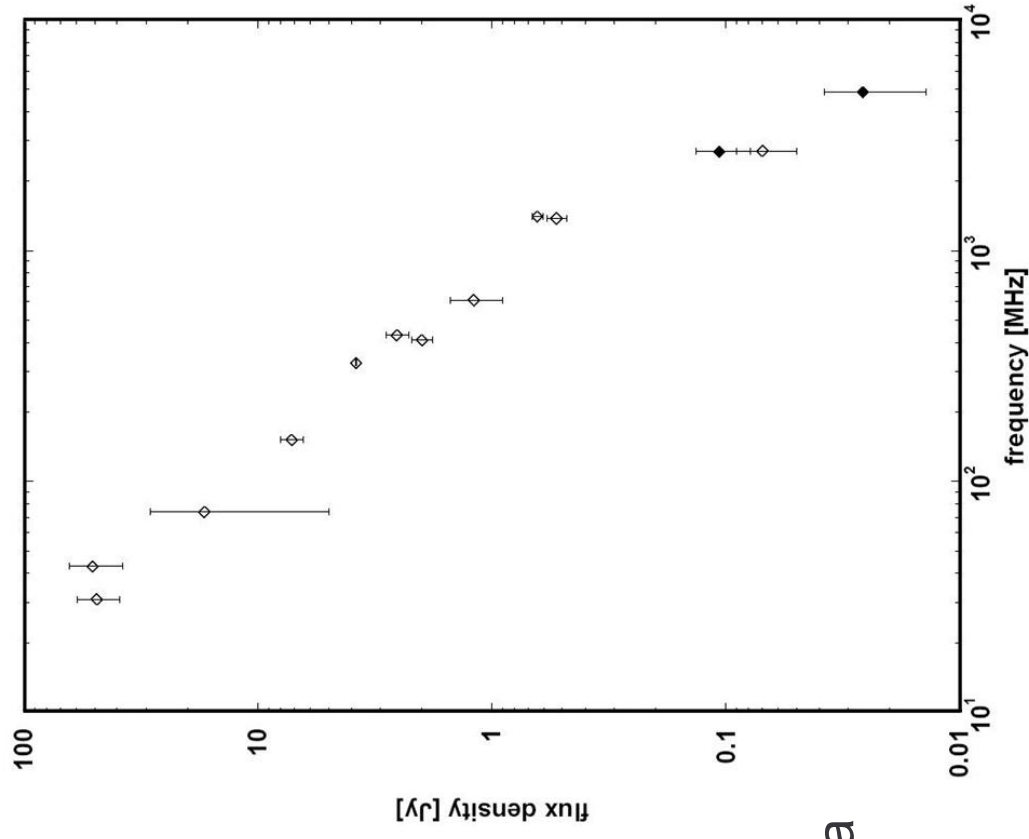
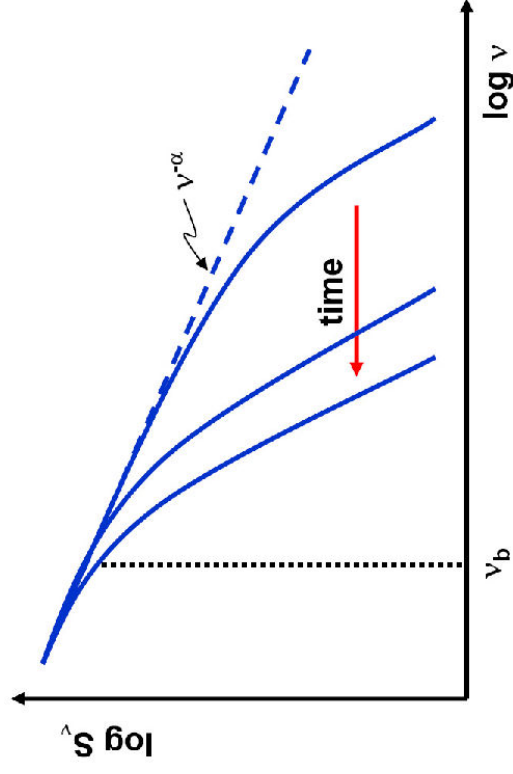


polarization ellipse



Poincaré sphere

synchrotron / Inverse-Compton losses and particle aging



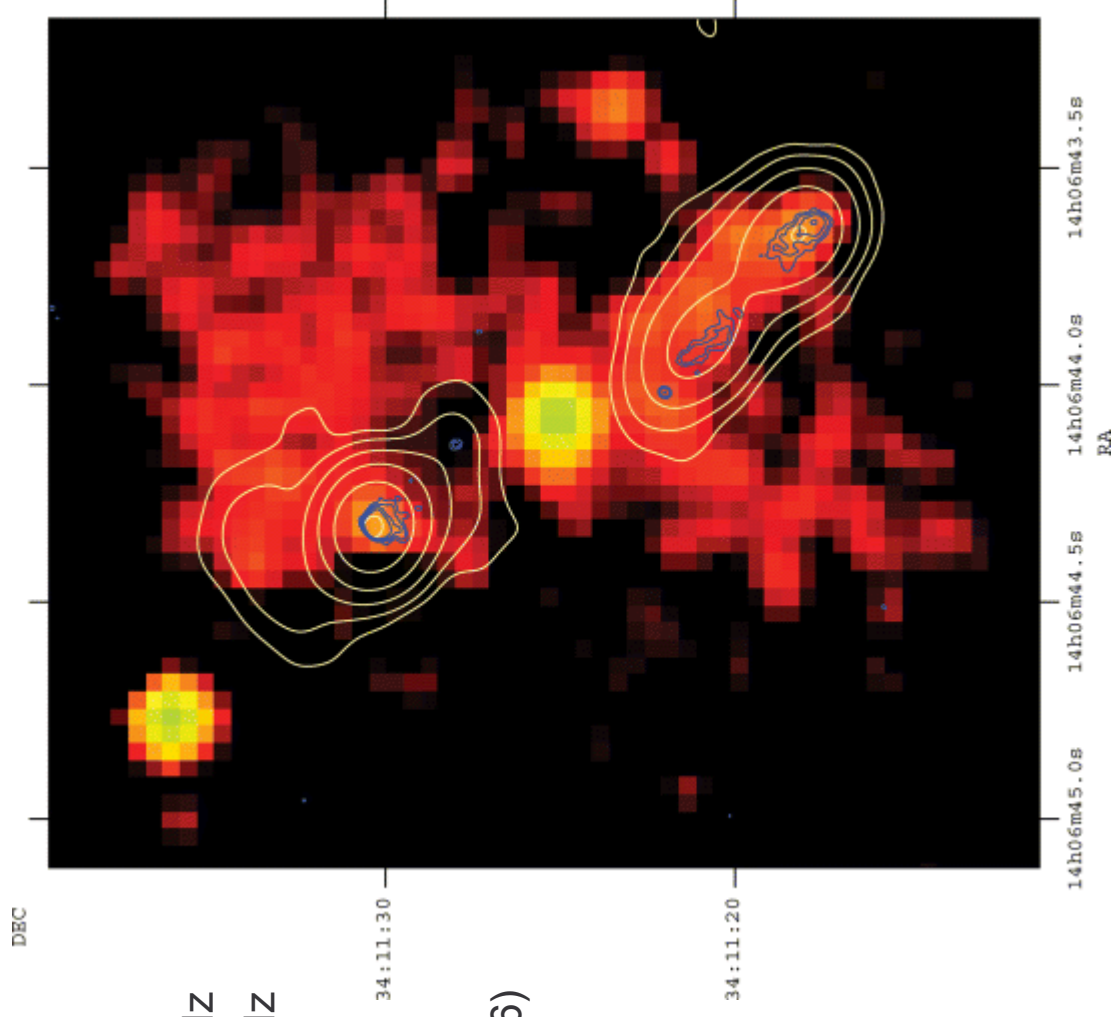
radio continuum
spectrum of the Coma
Cluster of galaxies

Inverse-Compton radiation from 3C 294:

blue contours: radio continuum at 8.5 GHz
yellow “ : radio continuum at 1.4 GHz

colour: 0.5–7 keV X-ray emission

(from Erlund et al., MNRAS 371, 29, 2006)



2.4 Spinning dust grains

Dust excess emission from PNe

